CLAIMS

1. A nitride semiconductor device comprising a p-type nitride semiconductor layer, an n-type nitride semiconductor layer, and an active layer interposed between the p-type nitride semiconductor layer and the n-type nitride semiconductor layer, wherein,

the p-type nitride semiconductor layer includes:

a first p-type nitride semiconductor layer containing Al and Mg; and

a second p-type nitride semiconductor layer containing Mg,

the first p-type nitride semiconductor layer being located between the active layer and the second p-type nitride semiconductor layer, and

the second p-type nitride semiconductor layer having a greater band gap than a band gap of the first p-type nitride semiconductor layer.

2. The nitride semiconductor device of claim 1, wherein

the second p-type nitride semiconductor layer functions as a barrier layer for suppressing a carrier overflow from the active layer.

3. The nitride semiconductor device of claim 1, wherein,

the first p-type nitride semiconductor layer has an Al concentration of no less than $1\times10^{20}cm^{-3}$ and no more than $2\times10^{21}cm^{-3}$; and

a region of the first p-type nitride semiconductor layer in which the Al concentration is no less than $1\times10^{20}cm^{-3}$ and no more than $2\times10^{21}cm^{-3}$ has a thickness of 1 nm or more.

4. The nitride semiconductor device of claim 1, further comprising a non-doped nitride semiconductor layer which contains Al and which is located between the first p-type nitride semiconductor layer and the active layer.

5. The nitride semiconductor device of claim 4, wherein the non-doped nitride semiconductor layer has a smaller band gap than a band gap of the second p-type nitride

semiconductor layer.

6. The nitride semiconductor device of claim 5, wherein the non-doped nitride semiconductor layer has a band gap equal to the band gap of the first p-type nitride semiconductor layer.

7. The nitride semiconductor device of any of claims 4 to 6, wherein a total thickness of the non-doped nitride semiconductor layer and the first p-type nitride semiconductor layer is no less than 1 nm and no more than 50 nm.

8. The nitride semiconductor device of claim 7, wherein the second p-type nitride semiconductor layer has a thickness of no less than 5 nm and no more than 20 nm.

9. The nitride semiconductor device of claim 8, wherein a region of the second p-type nitride semiconductor layer which has an Mg concentration of $8\times10^{18}cm^{-3}$ or less has a

thickness of 1 nm or less.

10. The nitride semiconductor device of claim 1, wherein,

the p-type nitride semiconductor layer further includes a third p-type nitride semiconductor layer having a smaller band gap than a band gap of the second p-type nitride semiconductor layer; and

the second p-type nitride semiconductor layer is located between the third p-type nitride semiconductor layer and the first p-type nitride semiconductor layer.

11. The nitride semiconductor device of claim 10, wherein the third p-type nitride semiconductor layer has a smaller band gap than the band gap of the first p-type nitride semiconductor layer.

12. The nitride semiconductor device of claim 10, wherein the third p-type nitride semiconductor layer functions as a cladding layer.

13. The nitride semiconductor device of any of claims 10 to 12, wherein at least one of the first p-type nitride semiconductor layer and the second p-type nitride semiconductor layer contains In.

14. The nitride semiconductor device of claim 13, wherein the second p-type nitride semiconductor layer has a greater In mole fraction than an In mole fraction of the first p-type nitride semiconductor layer.

15. A production method for a nitride semiconductor device including a p-type nitride semiconductor layer, an n-type nitride semiconductor layer, and an active layer interposed between the p-type nitride semiconductor layer and the n-type nitride semiconductor layer, wherein: the p-type nitride semiconductor layer includes a first p-type nitride semiconductor layer containing Al and Mg and a second p-type nitride semiconductor layer containing Mg; the first p-type nitride semiconductor layer is located between the active

layer and the second p-type nitride semiconductor layer; and the second p-type nitride semiconductor layer has a greater band gap than a band gap of the first p-type nitride semiconductor layer, the production method comprising:

a step of forming the n-type nitride semiconductor layer;

a step of forming the active layer;

a step of forming the first p-type nitride semiconductor layer containing Al and Mg by supplying both a source gas having Mg and a source gas having Al; and

a step of forming the second p-type nitride semiconductor layer by supplying a source gas having Mg.

16. The production method of claim 15, further comprising, before the step of forming the first p-type nitride semiconductor layer, a step of forming a non-doped nitride semiconductor layer which contains Al by supplying a source gas having Al without supplying any p-type impurities.

17. The production method of claim 15 or 16, wherein,

the first p-type nitride semiconductor layer has an Al concentration of no less than $1\times10^{20}cm^{-3}$ and no more than $2\times10^{21}cm^{-3}$; and

a region of the first p-type nitride semiconductor layer in which the Al concentration is no less than $1\times10^{20}cm^{-3}$ and no more than $2\times10^{21}cm^{-3}$ has a thickness of 1 nm or more.